

WHAT IS CLAIMED IS:

- 1 1. A method comprising the steps of:
2 chilling a protectant to cause an irreversible release of energy from the
3 protectant;
4 treating biologically active material with the protectant; and
5 freezing the treated biologically active material.
- 1 2. The method as in Claim 1, wherein said pre-conditioned solute is a solute
2 having been conditioned by being super-cooled at an average rate of at least
3 about 6.5°C per minute.
- 1 3. The method as in Claim 1, wherein said pre-conditioned solute is a solute
2 having been conditioned by being super-cooled from room temperature to a
3 temperature of less than about -23°C.
- 1 4. The method as in Claim 1, wherein said pre-conditioned solute is a solute
2 having been conditioned by being super-cooled from room temperature to
3 between about -23°C and -26°C.
- 1 5. The method as in Claim 1, wherein said pre-conditioned solute is a solute
2 having been conditioned by being super-cooled at an average rate of between
3 about 6.5°C and 8.5°C per minute.
- 1 6. The method as in Claim 1, wherein said pre-conditioned solute is a solute
2 having been conditioned by being super-cooled, for at least a portion of time,
3 at an average rate of at least about 17°C per minute.

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- 1 7. The system as in Claim 1, wherein the heat absorption rate of the pre-
2 conditioned solute is about 135 BTU at a temperature of between about -23°C
3 and -26°C.
- 1 8. The method as in Claim 1, further including the step of warming the protectant
2 prior to the step of treating the biologically active material.
- 1 9. The method as in Claim 8, wherein the step of warming the protectant includes
2 warming the protectant to above 0 degrees Celsius.
- 1 10. The method as in Claim 1, wherein the protectant includes propylene glycol.
- 1 11. The method as in Claim 1, wherein the protectant includes glycerol.
- 1 12. The method as in Claim 1, wherein the protectant includes DMSO.
- 1 13. The method as in Claim 1, wherein the biologically active material includes:
2 viable single cells, viable tissues, viable organs, viable nucleic acids, viable
3 ribonucleic acids, viable amino acid based compounds and viable lipid based
4 compounds.

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- 1 14. A method comprising the steps of:
2 chilling a protectant to below about -23 degrees Celsius to cause an
3 irreversible release of energy from the protectant;
4 warming the protectant to above 0 degrees Celsius;
5 treating biologically active material with the protectant; and
6 freezing the treated biologically active material.
- 1 15. The method as in Claim 14, wherein said pre-conditioned solute is a solute
2 having been conditioned by being super-cooled at an average rate of at least
3 about 6.5°C per minute.
- 1 16. The method as in Claim 14, wherein said pre-conditioned solute is a solute
2 having been conditioned by being super-cooled from room temperature to a
3 temperature of less than about -23°C.
- 1 17. The method as in Claim 14, wherein said pre-conditioned solute is a solute
2 having been conditioned by being super-cooled from room temperature to
3 between about -23°C and -26°C.
- 1 18. The method as in Claim 14, wherein said pre-conditioned solute is a solute
2 having been conditioned by being super-cooled at an average rate of between
3 about 6.5°C and 8.5°C per minute.
- 1 19. The method as in Claim 14, wherein said pre-conditioned solute is a solute
2 having been conditioned by being super-cooled, for at least a portion of time,
3 at an average rate of at least about 17°C per minute.
- 1 20. The method as in Claim 14, wherein the heat absorption rate of the pre-

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2 conditioned solute is about 135 BTU at a temperature of between about -23°C
3 and -26°C.

1 21. The method as in Claim 14, wherein the protectant includes propylene glycol.

1 22. The method as in Claim 14, wherein the protectant includes glycerol.

1 23. The method as in Claim 14, wherein the protectant includes DMSO.

1 24. The method as in Claim 14, wherein the biologically active material includes:
2 viable single cells, viable tissues, viable organs, viable nucleic acids, viable
3 ribonucleic acids, viable amino acid based compounds and viable lipid based
4 compounds.

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- 1 25. A biological material having been subjected to a cryopreservation process, the
2 cryopreservation process comprising:
3 chilling a protectant to cause an irreversible release of energy from the
4 protectant;
5 treating biologically active material with the protectant; and
6 freezing the treated biologically active material.
- 1 26. The biological material as in Claim 25, wherein said pre-conditioned solute is
2 a solute having been conditioned by being super-cooled at an average rate of at
3 least about 6.5°C per minute.
- 1 27. The biological material as in Claim 25, wherein said pre-conditioned solute is
2 a solute having been conditioned by being super-cooled from room
3 temperature to a temperature of less than about -23°C.
- 1 28. The biological material as in Claim 25, wherein said pre-conditioned solute is
2 a solute having been conditioned by being super-cooled from room
3 temperature to between about -23°C and -26°C.
- 1 29. The biological material as in Claim 25, wherein said pre-conditioned solute is
2 a solute having been conditioned by being super-cooled at an average rate of
3 between about 6.5°C and 8.5°C per minute.
- 1 30. The biological material as in Claim 25, wherein said pre-conditioned solute is
2 a solute having been conditioned by being super-cooled, for at least a portion
3 of time, at an average rate of at least about 17°C per minute.
- 1 31. The biological material as in Claim 25, wherein the heat absorption rate of the

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2 pre-conditioned solute is about 135 BTU at a temperature of between about -
3 23°C and -26°C.

1 32. The biological material as in Claim 25, wherein the cryopreservation process
2 includes warming the protectant prior to the step of treating the biologically
3 active material.

1 33. The biological material as in Claim 32, wherein the cryopreservation process
2 includes warming the protectant to above 0 degrees Celsius.

1 34. The biological material as in Claim 25, wherein said biological material
2 comprises viable single cells.

1 35. The biological material as in Claim 25, wherein said biological material
2 comprises viable tissues.

1 36. The biological material as in Claim 25, wherein said biological material
2 comprises viable organs.

1 37. The biological material as in Claim 25, wherein said biological material
2 comprises viable nucleic acids.

1 38. The biological material as in Claim 25, wherein the biological material
2 comprises viable ribonucleic acids.

1 39. The biological material as in Claim 25, wherein the biological material
2 comprises viable amino acid based compounds.

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- 1 40. The biological material as in Claim 25, wherein the biological material
2 comprises viable lipid based compounds.

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